

REMARKS

Applicants respectfully request reconsideration of the present application in view of the reasons that follow.

Claims 1-38 are currently pending to be examined on their merits.

I. Claim Rejections – 35 U.S.C. § 103

Claims 1-3, 7-33, 36-38 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over US 6,778,616 (“Halas”) in view of *Chem. Commun.*, 2002, 366-367 (“Azamian”). Claims 4-6 and 34-35 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Halas in view of Azamian, further in view of US 6,078,705 (“Neuschafer”). Applicants respectfully traverse these rejections.

A. Halas does not teach the claimed materials and the methods of making thereof

Contrary to the Office’s assertion on p. 2 of the Office Action, Halas does not teach or suggest the presently claimed materials. Particularly, nowhere does Halas teach or suggest the chromophores and the nanotubes, as recited in present independent claims 1 and 22.

The Office’s analogy between the nanoparticles of Halas and the chromophores of the present claims is incorrect. Nowhere does Halas teach or suggest that (1) the nanoparticles of Halas have **non-linear optical properties** and (2) the nanoparticles of Halas are **attached to defect sites on the carbon nanotubes**, as recited in present claims 1 and 22. In fact, the Office has acknowledged (2) on p. 2 of the Office Action.

The Office has not established any evidence that the carbon nanotubes of Halas have defect sites, much less attaching nanoparticles to the carbon nanotubes at these sites. To the extent that Halas discloses a combination of carbon nanotubes and nanoparticles, the combination is in the form of a **mixture**. A mixture of a carbon nanotube and a metal nanoparticle is different from a chromophore **attached to the defect sites** of a carbon nanotube.

B. No reason to combine the teachings of Halas and/or Azamian

The Office relies on Azamian to remedy the deficiencies of Halas. Applicants respectfully submit that this reliance is improper. Contrary to the Office's assertion on p. 3 of the Office Action, one of ordinary skill in the art would not have had a reason to combine the covalent bonding of single walled-nanotubes to metal nanoparticles, as taught by Azamian, with the optical device of Halas. In fact, such a combination would render the teachings of Halas inoperable for its intended purpose as a nanoparticle based sensor and/or would change the principle of operation of the sensor of Halas.

At the outset, the Office has not established evidence that there are defect sites on the carbon nanotubes of Halas, much less attaching nanoparticles to these defect sites, as recited in present claims 1 and 22, and as already explained in the previous section. Even assuming, *arguendo*, that there were such defects sites, the coupling of nanoparticles to the carbon nanotubes of Halas would make the device of Halas cease to function as a "nanoparticle-based" sensor. This is particularly evident in that the entire disclosure, including the figures, of Halas is drawn to a sensor that relies on the resonance behavior of **nanoparticles**, as opposed to that of nanoparticles that are attached to another entity. In fact, attaching nanoparticles to carbon nanotubes, as disclosed in Azamian and as recited in the present claims, would change the resonance behavior of the nanoparticles, thereby rendering the nanoparticle sensor of Halas inoperable as intended. Accordingly, no *prima facie* obviousness is established. MPEP § 2143.01 (V) (stating that if proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification).

In addition, such modification would change the principle of operation of the sensor of Halas, which relies on the resonance behavior of nanoparticles (as opposed to a nanoparticle-attached-to-carbon-nanotube sensor, as alleged by the Office). Thus, the Office has not established *prima facie* obviousness. MPEP § 2143.01 (VI) (stating that if the proposed modification or combination of the prior art would change the principle of operation of the prior

art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious).

Thus, one of ordinary skill in the art would not have had a reason to combine the teachings of Halas with those of Azamian.

C. Claims 4-6 and 34-35 are non-obvious over the teachings of cited prior art

In addition to the explanations set forth above, contrary to the Office's assertion on p. 5 of the Office Action, one of ordinary skill in the art would not have had a reason to combine the teachings of Halas and/or Azamian with those of Neuschafer. Neuschafer's teachings relate only to a sensor platform and do not remedy any of the deficiencies as set forth above. At the outset, in contrast to Halas' teachings (and the present claims), the dyes of Neuschafer are not bound or attached to any particularly entity, and thus one of ordinary skill in the art would have had no reason to attach the dyes of Neuschafer to the nanoparticles of Halas. Moreover, to the extent that Halas' teachings permit functionalizing the nanoparticles with another molecule, the molecule, such as para-mercaptoaniline, must exhibit a "strong Raman response," (see Halas, col. 3, lines 63-67). The Office has not established any evidence that the dye of Neuschafer exhibits a response, and the PSF dye of Neuschafer is clearly not the same as the para-mercaptoaniline of Halas. Even assuming, *arguendo*, that the dyes of Neuschafer were attached to the nanoparticles of Halas (and/or Azamian), in view of the forgoing, the attachment would alter the resonance properties of the nanoparticles, thereby changing the principle of operation of the teachings of Halas and/or Azamian or even render them inoperable. Accordingly, in line with the explanation set forth in the previous section, no *prima facie* obviousness has been established and claims 4-6 and 34-35 are separately patentable.

Therefore, at least in view of the foregoing, Applicants respectfully submit that the present claims are non-obvious over the teachings of Halas, Azamian, and/or Neuschafer, and thus respectfully request that the rejections be withdrawn.

CONCLUSION


Applicants believe that the present application is now in condition for allowance and respectfully request favorable reconsideration of the application.

The Office is invited to contact the undersigned by telephone if a telephone interview would advance the prosecution of the present application.

The Office is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By 

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